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The Asia Institute Seminar

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Speaker

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Emanuel Pastreich

I remember we spoke some time ago about your proposal for a "Global Science Corps" that would encourage a tradition of volunteerism in medicine and lead to a greater spirit of service. Tell us what progress you have made in that project.

Harold Varmus

I had great hopes for the proposal for a "Global Science Corps" for volunteer Service in the sciences. Although the initial proposal received a very positive response, the process since then has been rather frustrating because the program has never come to fruition, despite strong interest. As it turns out, setting up such a global program is not an easy endeavor. We were able to find people who were interested in becoming members of the corps. There were many who offered emotional and intellectual support that was most helpful. And there were also a number of institutions around the world that wanted to participate in terms of sending and receiving people.

What was difficult was raising funds on a sufficient scale to do the project effectively. After all, we were talking about sending experienced people, people who have advanced degrees and happened to find themselves perhaps between their academic training and a job with their own lab. Or alternatively, we were talking about people who were quite advanced in their career, people who were looking for new opportunities, or even on the verge of retirement. All these kinds of people might want to contribute, but it would not be easy for them to just get up and fly to the far corners of the earth. These people often have families, they expect decent salaries, and the resulting total expenses could add up to $ 100,000 or $ 200,000 a year for a more senior person. And then there was insurance and other issues added on top. If you are to start anything like this at a reasonable scale you would need a budget of at least a couple of million dollars a year. So you are really talking about a project that needs the support of a state, or of the Federal Government or a major foundation, for long-term success.

There has been much discussion about other proposals resembling the Global Science Corps and there has been an effort to implement a similar proposal with

medical personnel. Some parts of the concept are also manifest in the U.S. Science Envoy program that was recently launched by the White House. (The U.S. Science Envoy program was set up by the Department of State a few years ago in response to President Obama's speech in Cairo in which he spoke eloquently about the need to approach the Islamic world with technical and scientific assistance.)

Envoys for the U.S. Science Envoy Program are very senior people who go abroad to predominantly Muslim countries for relatively short periods of time, say a week or two. These individuals are not actually working abroad in laboratories. Although such science envoys are thus a bit different than the Global Science Corps we conceived of, the general idea has come up in important writings by a variety of people, including the Under Secretary of State for Economic, Business, and Agricultural Affairs Bob Hormats and Secretary of State Hillary Clinton in her speech about science diplomacy. The U.S. Ambassador to Turkey, Frank Ricciardone, has put great stress on promoting scientific exchange, and scientists play an important role at his embassy.

To come back to our theme of Korea's global role, I think that science diplomacy is one place where Korean scientists can play a central role, especially in Asia. China has made major investments recently in science diplomacy, dispatching numerous scientists to Africa where they are having significant impact.

We are also in the midst of setting up a new Center for Global Health at the National Cancer Institute here in Washington D.C. As part of that effort we are building our own network with partners in Asia, Central and South America, and Africa so that we can promote better approaches to cancer research and the use of new clinical tools to improve detection, prevention and care in those countries. As we look for partners around the world, we find that there are some people already there. Sometimes they are American, but increasingly they are Chinese. Korea is starting to play a role, and overall Korea is well positioned, with its trained scientists and its strong scientific base, to play an important role in promoting international cooperation and in breaking down barriers between nations. In fact, promoting the understanding of science in North Korea could be an excellent way to find common ground and set the stage for further cooperation.

Scientists have an advantage that many other citizens don't have. Because most scientific journals are in English, scientists have the basic ability in most countries to communicate effectively with their counterparts from other countries. Using the English language and building on a solid foundation of scientific principles can help in moving away from ideology or rhetoric. We should take advantage of the common ethos in science: the commitment to objective and accurate research, the sharing of information and cooperation in research. , We can work together, globally, to find new applications for research results. It has been shown consistently that international cooperation in the sciences is particularly amenable to improving relations between countries that have had difficulties in the past.

Emanuel Pastreich

One of the challenges with North Korea is that, because it is so militarized as a society, it is hard to do anything which somehow doesn't involve something related to the military. There may be opportunities to use science to promote better relations, but there is always a concern that any new technology introduced can be then find a military application.

Harold Varmus

I don't know North Korea well and I've never been there, so I cannot describe the research infrastructure that exists in Pyongyang. Nevertheless, I would suggest that we start collaboration at the university level and ask people at Seoul National University and KAIST to invite peers from North Korea for visits that will build up closer personal relations.

I don't know how easy it is to cross the border, but I know it can be done. Especially if we start with fields that do not have direct military applications, there is much potential for effective cooperation. I have found that collaboration in science is an excellent means to build closer relations and it provides its own platform for objective discussions and long-term exchanges.

Emanuel Pastreich

Let me ask you a question about Korea's new economic role in the world. Korea has risen to a position of prominence in Asia, especially over the last 5-6 years. In business and in technology, Korea is becoming more and more of a role model for developing countries in Asia and around the world. Koreans did not anticipate that they would be playing this role so early in their development. They thought they had other twenty years to develop before they played a leadership role. Do you have any advice for Korea going forward?

Harold Varmus

I've only been to Korea once---I think it was early 1994. I was deeply impressed by the commitment Korea had made to basic science and to scientific education. Already there were a number of Korean firms like Samsung and LG that were producing excellent automotive and electronic products. I was just in my first year as director of the National Institute of Health at the time. I remember vividly that on the first night we were hosted by a group of National Institute of Health alumni in Seoul. There were several hundred people there who had trained at the NIH at one time or the other and were doing research in the biomedical field in Korea. There was a pretty impressive contingent of expertise, and some people I had known before but most I hadn't. That was an extremely promising time, and their facilities were well funded and well equipped. In the nineteen years since, Korea faced any number of challenges, including financial ups and downs. But throughout all that, Korea's determination to be a leader in science and technology has been solid.

Emanuel Pastreich

What has changed recently is the range of people who visit Korea. They come for training, they come to benchmark Korean institutions and they come to find opportunities. 20 years ago, it was not that obvious that you should go to Korea to learn how to run a waste water treatment plant or how to design a laboratory. But now many from the Middle East or Africa or other Asian countries favor Korea . Korea seems to be more accessible, more relevant to their needs.

Harold Varmus

I wonder if the change is one in Korea itself, or rather the emergence of a large number of developing countries that are in a position to learn from Korea. Previously many of these countries were not ready for advanced manufacturing or water treatment plants. 20 years ago, Samsung was already a giant in electronics from which one could learn a lot. But few could make use of that know how. I think what happened is that many African countries, and the more challenged countries of Asia, find that they are in a position to improve the economy and move on to the next step in development. For India, for example, Korea is interesting now because their fundamental production base has evolved dramatically. The amount of money invested, and the sophistication of production has increased. One sees similar changes in China. Programs like student exchanges and mentoring are tremendous opportunities for Korea today.

Emanuel Pastreich

As South Korea plays an increasing central role in training the next generation of specialists, as the model that others are benchmarking, do you have any thoughts or advice as to how Korea should handle this opportunity?

Harold Varmus

This is not my field of expertise, industrial benchmarking. Nevertheless, I do think that Korea, with its outstanding accomplishments in science and technology has been given a rare opportunity to enhance relations with other countries around the world in a manner that is conducive to better international relations. Korea's expertise also offers an opportunity to bring in talented people from other countries for training and for absorbing some of those qualities that have made Korea successful.

In America we have found throughout our history, and especially in the post-World War II era, that maintaining an open door for scholars to come here as graduate students and postgraduate researchers, has been of immense value. There are several reasons why such exchanges have profound significance. First of all, having smart people come to the United States to train makes our own laboratories more stimulating and makes us more productive. Secondly, many of the best researchers who come to the United States stay here. And that's a good thing for our own economy and for our own scientific establishment. And thirdly, I think it

is very much to our advantage to create that sort of global soft power that comes from a mature network of talented people who train here and take our values back home with them to create other cultures of science that are compatible with our own.

The American way of doing science has changed the way science is done internationally. Our approach is very different from the way science is done in Europe. Europe was the dominant force in science for the first half of the 20th century, but it was culturally stiff and hierarchy was dominant. The American culture of science is much less hierarchical; it gives more authority to students and post docs and the laboratory is simply more democratic.

We think that it is important to have a level playing field in science because researchers often have their best ideas when they are in their 20s and 30s—while still in their training programs. That American way of science has permeated significant parts of the world with huge benefits for research. However, there are still places in Asia where science is run more like it was in the early days of the 20th century in Europe. The senior researcher has all the power and all others are regulated to secondary tasks and just doing what the boss tells them.

But there is a significant group of scientists in Korea who had seen the way science is conducted in America and adopted it for themselves. Korea can take the initiative, and is taking the initiative, in helping to pass on what is best in science to the rest of the world.

Emanuel Pastreich

You mentioned science diplomacy and America's role over the last fifty years. In this age of limited budgets, what do you think is the focus today for the United States in terms of science diplomacy?

Harold Varmus

That is a good question. The Federal government does face significant economic challenges in funding that limit the scale of what we can do globally.

You might think that researchers would just want to focus on research that can be done easily in the United States and put off international collaboration until there is

sufficient funding, but in fact we find that there is always a real interest, and a real need, to explore scientific issues internationally. At the National Cancer Institute, we have set up a new Center for Global Health and we are aggressively engaged in building a wide range of international collaborative activities related to many aspects of cancer research. I am finding no resistance among my colleagues to such international work. We continue to encounter tremendous enthusiasm for such collaboration. Part of that support comes from self interest. There is much to be learned from the study of cancer in different parts of the world. There is much we can gain from such collaboration. And such exchanges assure that the United States is attractive to researchers around the world, who are a source of talent for the US scientific community.

So international collaboration is certainly not foolish altruism. We can all agree on the benefits for the world, and the advantages of the United States, to be gained through international engagement in Science and Technology.

Emanuel Pastreich

As of this month a free trade agreement between the United States and Korea goes into effect. The agreement concerns trade and investment, but it does have potential impact in the sciences as well. in terms of encouraging cooperation between United States and Korea. What are your thoughts about this development?

Harold Varmus

It depends on the kind of science we are talking about. I don't think you need free trade in order to establish scientific exchange. There are issues in trade that can affect science, however, and to the extent we are not fighting over tariffs the environment will be better. There are probably issues about applications of science and certain kinds of technologies that are a little more complicated. I don't know what the implications are for the pharmaceutical industries and the information technology industry.

Emanuel Pastreich

The general perception of Korea among scientists is that Korea tends to be very focused on the applied sciences based as opposed to basic research. Have you found this to be the case?

Harold Varmus

My experience is limited to one trip, but I know several Korean scientists working in basic research, and many of them are quite distinguished. But I do think it is true that Korea's international reputation is strongest in applied sciences---in IT, electronics and other sectors where Korean industry leads. That technological prowess has helped Korean research immensely.

Choi Won-jun, (Undergraduate student, Konkuk University)

My understanding is that while you have been at NHI there has been much debate about whether funding for stem cells and other such research that employs human embryos is unethical or potentially degrading to humans. In Korean society, we have seen the pros and cons of medical ethics much manipulated for political gain. What are your thoughts and what do you think the proper limits should be on research?

Harold Varmus

The issue of working with cells from human embryos is rather complex and we have been struggling with its implications for almost twenty years. At the moment, direct research on human embryos cannot be carried out with federal money in the United States. That's the law on the books. Personally I think that law should be overturned. We do allow use of Federal funds for research on cells after they have been derived from embryos, but the research derived those cells from embryos must be carried out with other sources of money, such as funds from states, foundations, corporations, and individual donors. This research is not prohibited—it just cannot be carried out with federal money.

The most important result of that work on human embryos is the derivation of embryonic stem cells. It is permitted to use federal funds to support research that employs human embryonic stem cells. There is a great deal of such research being funded the by the NIH, both on the NIH campus and universities and research institutions in this country and around the world. I strongly believe as long as there is an appropriate ethical oversight of such work, the research is potentially very valuable and should be continued.

The work is done with embryos that have been donated for research by people who created those embryos in an effort to have children. When there are embryos that are not going to be used and that would otherwise be discarded, they are donated to the research as a source from which to derive stem cells. I think it would be a mistake not to do use such embryos; to discard those embryos that could be useful in an effort to understand the development of the embryo and possibly for the development of medical therapies is not a wise decision.

There is wide support for the current policy in the US. There are some people who are opposed, but in general the public supports that research.

We still have not had the hoped-for advances in clinical therapies through stem cell research. But we now have a new approach to generating stem cell lines, pioneered largely by Kyoto University Professor Shinya Kamanaka, that may lead to a revolution. Professor Kamanaka has created "pluripotential precursors" from ordinary cells that can serve as an alternative to embryonic stem cells in some settings.You take a normal cell from a mouse or a human being and introduce genetic information that allows the cell to behave more or less the way an embryonic stem cell would behave—not exactly the same way but in a similar fashion. Those cells can be derived from the patient who needs treatment and it is possible to generate cells that would differentiate into a variety of more specialized cells that could be used therapeutically. Moreover these cells can provide a

tremendous opportunity to understand how you get from a very primitive stem cell state to a higher degree of differentiation. That, in some ways is still the most powerful thing that has come out stem cell research. People are hoping to treat diseases with such cells, and that may well happen, but right now the important thing is to increase our understanding of a deep mystery: how does one fertilized cell become a complex individual? How does a stem cell in a certain tissue become all the different cell types that make that tissue or organ function properly? These are big deep medical and biological issues.

Emanuel Pastreich

It is not easy to understand Korea in terms of education. One of the most interesting parts of Korea is its educational system. One of the great criticisms made of Korean education, especially by Koreans themselves, is that the educational system is so much reliant on rote memorization and preparation for tests and is not sufficiently creative to produce leaders. Yet I find students in my class that are remarkably creative and thoughtful. They manage to get through that educational system.

How do you get students to learn the basics, which are not always fun to learn, and at the same time cultivate the creativity that is necessary in science?

Harold Varmus

The question of how to teach science effectively is a serious issue in the United States as well. There several new interesting programs for teaching children in elementary school how to approach a scientific question. These programs strive to capture their imagination and give them inspiration. We need to teach youth about the experimental method from early on in a comprehensive manner.

We have many reports, such as those from the National Academy of Sciences, the President's Council of Advisors in Science and Technology, and from the Carnegie Institution that present plans for teaching science more effectively at every level including college. We find that college teaching is so often geared toward rote learning to a degree that undermines the creative process required for experimentation.

My advice to Korean educators is that they should learn as much as possible from the experiences of other countries. The United States and Great Britain have produced some of the more enlightening thinking on this topic, but many others are also experimenting with promising approaches to teaching science that strive to make science not just a bank of knowledge, but a mode of inquiry. I would contend that science in its basic nature is not different from the thinking one should apply in an investigation of history or literature, or any other subject. The issue is how you systematically question assumptions, make decisions and draw conclusions on the basis of evidence. Once you are committed to evidence-based learning and decision making, you start to think in a more analytical manner, no longer simply accepting what you are told.

Emanuel Pastreich

What is the level of awareness of Asia in American science today?

Harold Varmus

At this moment in the United States, when most budgets for science are essentially flat, we find a strong argument made that in order to fight the current economic downturn we need to invest heavily in science and technology and in the training of scientists. That investment makes sense in a domestic context, but that argument is even more persuasive in light of the dramatic rise of science and technology in Asia.

Of course Americans are far more aware of China than they are of Korea in this respect. The growth rate in science and technology for China is extremely steep. That is increasingly the case for India as well. China is emerging as a player in medical and genetic research and in information technology and India is strong in information technology. There is general agreement on the strength of researchers and infrastructure for science in Japan and Korea, and there have been considerable advances in Thailand and Singapore as well, though they are still not at the highest level. It is the combination of the amazing rates of growth in science and technology with large populations that is making everybody take note of what happens in China and India.